

What is claimed is:

1. A catalyst composition comprising:

a perovskite composite oxide of the type expressed by a rational formula ABO_3 ;

the rational formula ABO_3 is expressed by a formula $A'_{1-x}A''_xB'_{1-y}B''_yO_3$,
and

the A' is La or Ce or both of them, the A'' is at least one element selected from the group consisting of La, Ca, Sm, Ce, Sr, Ba and Pr, the B' is at least one element selected from the group consisting of Co, Fe, Mn and Gd, and the B'' is at least one element of noble metals.

2. The catalyst composition according to claim 1, wherein the noble metal in B'' is at least one element selected from the group consisting of Ru, Rh, Pd, and Pt.

3. The catalyst composition according to claim 1, wherein the A' is La, the A'' is Pr, the B' is Fe, and the B'' is Rh.

4. The catalyst composition according to claim 1, wherein the x is set in a range of $0.1 < x \leq 0.5$, and the y is set in a range of $0.05 < y \leq 1$.

5. A method of producing the catalyst composition set forth in claim 1, comprising:

preparing a mixed solution by mixing chloride, nitrate, or carbonate of La or Ce, at least one type of chloride, nitrate, and carbonate of at least one element selected from the group consisting of La, Ca, Sm, Ce, Sr, Ba, and Pr, at least one type of nitrate and carbonate of at least one element selected from the group consisting of Co, Fe, Mn, and Gd, and at least one type of chloride and nitrate of at least one element selected from the group consisting of Ru, Rh, Pd and Pt;

preparing a monooxy carbonate as an intermediate product by reacting the mixed solution with a carbonate based on a hydrothermal reaction; and heating the monooxy carbonate in an oxygen atmosphere.

6. A reforming catalyst for producing hydrogen from hydrocarbon-based fuel or alcohol-based fuel, comprising:
a honeycomb substrate; and

a catalyst composition coated on the honeycomb substrate and set forth in claim 1.

5 7. An electrode catalyst for a fuel cell, comprising:
a catalyst composition set forth in claim 1.

8. A fuel cell comprising:
a solid electrolyte substrate;
an electrode catalyst adhered onto one surface of the solid electrolyte
10 substrate and having the catalyst composition set forth in claim 1; and
an air electrode adhered onto the other surface of the solid electrolyte substrate.

15 9. A reformer for reforming a fuel gas, comprising:
a gas inlet port;
a reactor vessel in which a reforming catalyst containing the catalyst composition set forth in claim 1 is provided to its inside and which causes a reforming reaction of a gas supplied from the gas inlet port; and
a gas outlet port of a gas reformed by the reactor vessel.

20 10. A methanol reforming apparatus, comprising:
a fuel gas supply source;
an oxygen supply source;
a steam supply source;
25 a reformer set forth in claim 9; and
pipings for supplying a fuel gas, an oxygen, and a steam supplied from respective supply sources to the reformer.

30 11. A fuel cell system, comprising:
a reforming apparatus set forth in claim 10;
a fuel cell;
pipings for supplying a gas reformed by the reforming apparatus to the fuel cell; and
35 pipings for supplying a gas containing oxygen to the fuel cell.